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(54) **INGOT GROWING APPARATUS**

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2007/0193500 A1* 8/2007 Inagaki C30B 15/20 117/11

FOREIGN PATENT DOCUMENTS

JP	06-234593	*	8/1994
JP	06234593	A	8/1994
KR	1020010082689	A	8/2001
KR	101155413	B1	6/2011
KR	101153979	B1	6/2012
KR	101159270	B1	6/2012

* cited by examiner

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(57) **ABSTRACT**

An ingot growing apparatus. A main chamber includes a crucible accommodating a source material therein and a heater melting the source material by heating the crucible. A dome chamber is disposed on top of the crucible. A pull chamber is disposed on top of the dome chamber. An ingot grown in the crucible moves via a seed cable within the dome chamber and the pull chamber. A weight-measuring unit is disposed on top of the pull chamber. The weight-measuring unit includes a housing disposed on top of the pull chamber, with the interior thereof being maintained in a vacuum state, a support roller disposed within the housing to support the seed cable, and a load cell disposed outside of the housing to measure a weight of the ingot supported by the support roller.

7 Claims, 3 Drawing Sheets